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Further Progress in Rehabilitating Oyster Stocks

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THIS IS the fifth of a series of publications describing the disease in recent years in oyster populations of the Maritime Provinces. While creating heavy mortality in oyster stocks the disease is not harmful to humans. The four earlier publications described the history of the disease, the steps taken by the Government of Canada to counter its effects, and the results. This circular advances observations and conclusions to the end of 1964.

BRIEF HISTORY

Prince Edward Island

The disease first appeared in 1915 in Malpeque Bay. Oysters in this area suffered mortalities of over 95% but slowly developed resistance and the fishery recovered some 20 years after the first mortalities.

Between 1915 and 1937 heavy mortality occurred in all the oyster populations of Prince Edward Island. When the fishery of Hillsborough Bay was affected an attempt was made to hasten recovery by introducing resistant Malpeque Bay stock. This appeared to be effective, as the fishery recovered in 10 years.

Mainland New Brunswick and Nova Scotia

For a time Northumberland Strait was an effective barrier to the spread of the disease and mainland stocks were not affected until 1955. In the next few years the disease spread rapidly and by 1960 had devastated oyster stocks in almost all New Brunswick and Nova Scotia areas west of Cape George, Nova Scotia.

PLANS FOR REHABILITATION

Early observations suggested that the mainland disease was identical to that experienced on Prince Edward Island and that P.E.I. oysters were resistant to it. Later observations have confirmed both these conclusions.



Disease - resistant oysters being distributed in Miramichi Bay, N.B.

In the Charlottetown epidemics transplants of resistant stock appeared to have accelerated recovery of the fishery. In the light of this the Department of Fisheries of Canada and the Fisheries Research Board of Canada devised a plan to make mass transplants of disease-resistant P.E.I. oysters to mainland areas affected by the disease. Transfers made by Department of Fisheries personnel were monitored by Fisheries Research Board scientists. The development of resistance in mainland populations and the spread of disease has been monitored by Research Board scientists assisted by Department field staff. Department staff have also made surveys of oyster populations in the rehabilitated areas.

REHABILITATION TRANSPLANTS

Transplants of adult oysters

Healthy oysters suitable for transplanting yet not of a shape suitable for marketing, were available

in Bedeque Bay on Prince Edward Island, and between 1957 and 1962 over 11,000 barrels of these oysters were moved. The intensive fishing caused a marked improvement in the shape of Bedeque Bay oysters and this is now a source of good quality stock for relaying.

The table below, which corrects and amends a similar table appearing in Circular No. 34, shows the sizes of the transplants and the sites of planting in mainland areas.

Area	1957	1958	1959	1960	1962	Total bbls.
New Brunswick						
Shippegan area	1,000	100				1,100
Caraquet Bay			1,075	525		1,600
Lameque Bay			300			300
Miramichi Bay	2,800	200				3,000
Kent Co. areas	1,500	300				1,800
Tracadie Bay				200		200
Shediac Bay				9	300	309
Miscou Harbour					700	700
New Brunswick total						9,009
Nova Scotia						
Wallace-Malagash	500					500
Caribou Harbour		55	380			435
Pictou Harbour		45				45
Amet Sound			1,000			1,000
Merigomish Harbour				140		140
Nova Scotia total						2,120
Grand total						11,129

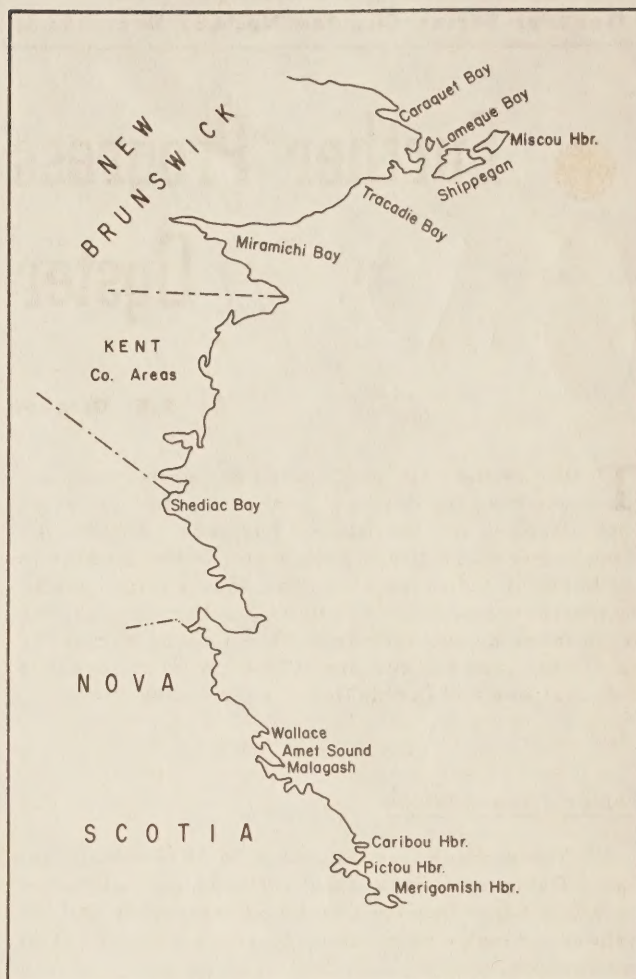
All known disease-affected areas have now received rehabilitation transplants. The disease has shown no spread in recent years. Presumably there is some barrier which prevents its entry into the Cape Breton area, where oysters are still susceptible.

Transplants of spat

Additional supplies of resistant oysters have been made available to oyster farmers on the mainland through the Department's sale of P.E.I. produced spat. These will spawn and add to the recovery of mainland fisheries as they grow. The quantities supplied to mainland growers have varied with supply and demand and are shown below.

	1961 bbl.	1962 bbl.	1963 bbl.	1964 bbl.	Total bbl.
New Brunswick	59	49	66	69	243
Nova Scotia	4	5	5	15	29
Grand total					272

These 272 barrels represent some 1,088,000 oysters.



Map showing areas where Bedeque Bay oysters were transplanted to the mainland under a rehabilitation program. Between 1957 and 1962 more than 11,000 barrels of oysters were transplanted.

SURVIVAL AND SPAWNING OF TRANSPLANTS

Transplanted oysters held on trays have survived well and have been seen to spawn in a number of mainland areas.

DEVELOPMENT OF RESISTANCE

To test whether spat setting in mainland areas were resistant to the disease, they were held in their native areas on trays along with spat of the same age (year-class) that were brought in from outside areas. Some of these introduced oysters were resistant and some were susceptible to Malpeque disease. The mortality rates (%) of all three groups were compared.

The results obtained in one area, Malagash, Nova Scotia, are shown on following page.

Total mortality (per cent) of spat up to the end of their third year of life. Results for four different year-classes are shown.

	YEAR-CLASS			
	1958	1959	1960	1961
STOCK				
Resistant - P.E.I.	20.2%	14.2%	21.4%	14.2%
Natives - Malagash	88.0%	21.1%	27.1%	28.6%
Susceptible -				
Cape Breton	93.3%	91.5%	90%	65.7%

The table shows that mortalities among susceptible (Cape Breton) spat were always high (65-93%). In contrast, mortalities of resistant (P.E.I.) spat were always low (14-21%). But mortalities of native spat were high at first (1958 - 88%) and decreased thereafter to levels approximating those of resistant spat.

Resistant adult brood stock were moved to this area (Wallace-Malagash) in 1957. And it was expected that the spat which settled there in 1958 would be the offspring of these and, therefore, resistant. But obviously they were not.

The only explanation we can offer for this is that the spat which settled in Malagash in 1958 were the offspring of the few surviving Malagash natives which were susceptible. This implies that the transplanted oysters did not reproduce that year. From 1959 onwards, however, the spat that settled at Malagash survived almost as well as P.E.I. spat. This indicates that they were the offspring of the transplanted resistant stock. Apparently it took a year before the introduced animals were sufficiently adjusted to their new homes to spawn successfully.

The continued high mortalities of susceptible Cape Breton spat show that the disease is still active in the Malagash area, and that our results do show a true resistance and not any decrease in the activity of the disease.

The information is not so complete from other regions, but all mainland areas as far north as and including the Miramichi have shown this same development of resistance.

CONTRAST OF NORTHERN AND SOUTHERN AREAS

To the north of the Miramichi the picture was very different. There the spatfall is always less regular and thus there were few year-classes of spat to test. Nevertheless, we made enough observations to show that the spat settling there are mostly susceptible. Apparently they are the offspring of the few surviving susceptible native stock. The results of this failure are illustrated by the tabulated comparison of commercial landing of oysters in the areas north and south of the Miramichi for the years 1955-1964.

Commercial catch of oysters in New Brunswick

(Thousands of pounds in shell)

	Areas north of Miramichi	Miramichi and areas to the south
1958	140.1	2.4
1959	57.0	17.8
1960	0.1	6.0
1961	0	123.0
1962	0	217.0
1963	0	212.0
1964	0	390.09

North of the Miramichi the catch declined through 1958 and 1959, as the disease spread. Since then there has been no commercial fishing. South of the Miramichi, the catch declined through 1960, but since then it has steadily increased. The fishery is now well on the way to recovery.

We predict complete recovery in the southern areas, the rate depending on the success of natural spatfalls and the initiative of oyster growers in making fullest use of these spatfalls. We cannot forecast what may happen in northern areas because we have only a partial understanding of what has been happening there. However, recent studies are clarifying the picture.

THE PROBLEM IN NORTHERN AREAS

The original transplants to northern New Brunswick were adult Prince Edward Island oysters imported in 1957 and 1958. We know these have survived well. We also know that they have spawned. But recent studies show that they spawn 2 or 3 weeks later than the native Shippegan oysters. Apparently they have not adapted to the climate of their new home.

Late spawnings mean late spatfalls. Spat that settle late in the year show heavy winter mortalities. And we now believe that, even though the introduced oysters have spawned, their spat have died during their first winter. We think that the only spat that have survived the winters were the offspring of the few surviving susceptible natives that spawned early. These spat would inherit their parents' susceptibility and most of them would be expected to die off before they were 3 years old. Since oysters are capable of spawning at the end of their first year, stocks which are susceptible to the disease can perpetuate themselves, even though none attain marketable sizes. This would explain why the Shippegan oyster stocks have not recovered.

ENCOURAGING DISCOVERY

The recent comparisons of spawning behaviour of adult oysters were supplemented by observations

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on the transplanted P.E.I. spat. The tests showed that these spat adapted quickly to their new homes and spawned at the same time as the native oysters. Their offspring should be able to survive the winter.

We hope that we have now discovered both the cause of the failure of the rehabilitation transplants and the way to restore the oyster stocks in the northern areas. The remedy would be mass transfers of resistant P.E.I. spat to serve as resistant breeding stock.

Unfortunately, adequate supplies of resistant spat have not been available. But the Department of Fisheries oyster hatchery program, which is showing great promise, may make the provision of such spat a possibility in the near future. However, even if spat become generally available, rapid recovery in the northern areas cannot be expected. Success-

ful spatfall there has always been spasmodic and growth slow. Recovery is almost certain to be a gradual process.

Observations are continuing on the recovery of the mainland fishery, and experimental work on the disease is being carried out to better understand and combat it. A good deal of the oyster producing area of eastern Nova Scotia is still unaffected and is populated with highly susceptible oysters. Until we are sure that these areas will not be infected we must guard against such infection and be ready to take remedial action. But we do think that we have discovered the key to rehabilitation of the mainland oyster industry west of Cape George, N.S.

NOTE: This is number 64 in the series of publications of interest to east-coast oystermen. The previous one (63), "First Supplementary List of Useful Publications for Oyster Farmers of the Maritimes", took into account the earlier publications (Nos. 48, 49, 50, and 60) on oyster disease in the Maritimes.